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ESH-17 Worldview

The Air Quality Group

AIRNET Data Evaluation during the Cerro Grande Fire

Interpretation of Preliminary Air Monitoring Data Gathered During the Cerro Grande Fire by the LANL's Air Quality Group

Quick Links

Summary

This page describes the ambient air quality data collected by the Air Quality Group (ESH-17) for Los Alamos National Laboratory during the Cerro Grande fire. These data are compared to historical measurements to assess the impact of the forest fire on ambient levels of radioactive air contaminants and particulate matter. Our initial data indicate significant increases in the ambient concentrations of radon decay products (lead-210, bismuth-210, and polonium-210). The cause of these increases is attributed to the long-term deposition and accumulation of these particles on the vegetation and the forest floor that were resuspended by the Cerro Grande fire and added to the existing ambient concentrations. Isotopic data are not yet complete, but these include samples collected from sites with extensive smoke impact throughout the fire. Measured concentrations may have been higher during the fire, but most concentrations were below their measurement uncertainties. In addition, isotopic comparisons indicate that the higher uranium concentrations are natural uranium instead of depleted or enriched uranium from Los Alamos National Laboratory. All of the air quality data posted to this web site after the QA evaluation has been completed. An operating history of the sampling network during the period of the fire is also available.

The EPA and the DOE Radiological Assistance Program (DOE/RAP) also collected and analyzed air samples during the fire. Each organization has reported preliminary results from their monitoring efforts. Each has concluded, based on their preliminary analyses that there is no evidence of man-made radionuclides being released during the fire. A summary of these other sampling programs is available.

top of page

Introduction

The radiological air sampling network, referred to as AIRNET, at Los Alamos National Laboratory (LANL or the Laboratory) is used to measure environmental levels of airborne radionuclides that may be released from Laboratory operations. Laboratory emissions potentially collected by AIRNET samples include plutonium, americium, uranium, and tritium. Each AIRNET station collects two types of samples for analysis: a total particulate matter sample and a water vapor sample.

Under normal circumstances, several sources for radioactivity in the atmosphere are measured on our AIRNET filters. These include radon or other natural decay products, resuspended particulate matter, and emissions from past and/or current LANL activities. Measurements typically well above their uncertainty levels, which are considered quantified values, include gross (or total) alpha activity, gross (or total) beta activity, uranium-234, uranium-238, beryllium-7 and lead-210. Radon decay products are measured by gross alpha activity (polonium-210), gross beta activity (bismuth-210), and gamma spectroscopy (lead-210); beryllium-7 is created in the atmosphere by cosmic ray interactions with common gases; and the uranium isotopes are usually natural uranium from resuspended particulate matter. However, there is one on-site sampler that consistently shows an impact from past usage of depleted uranium. Most measured concentrations of plutonium and americium are less than their associated uncertainties, but several onsite AIRNET samplers near known sources regularly have concentrations above the uncertainty levels.

top of page

Sampling and Potential Fire Effects

Particulate matter in the atmosphere in New Mexico is usually caused by the resuspension of soil, which is dependent on meteorological conditions. Windy, dry days can increase the soil resuspension, but precipitation such as rain or snow can wash particulate matter out of the air. Consequently, changing meteorological conditions often cause large daily and seasonal fluctuations in airborne radioactivity concentrations. The Cerro Grande fire completely changed these "normal" factors. This fire, or any vegetation fire, will release the radioactivity in and on the vegetation to the atmosphere. Conceptually, this material will be added to the concentrations already present in the air. The fire may also re-suspend additional particulate matter from the Earth's surface by the physical turbulence associated with burning or it could burn contaminated material and release radioactive particulate matter. The temperature of the fire and the volatility of the element or compound will greatly influence ambient concentrations. For example, volatile materials such as lead and polonium will be vaporized and then preferentially enriched on fine particles due to their high surface area. Conversely, most of refractory materials, such as potassium and uranium that are not vaporized during a fire will be found in the large particles and the ash along with most of the remaining mass.

On May 4, 2000, National Park Service personnel ignited a prescribed burn at Bandelier National Monument, which escaped their control and was declared a wildfire on May 5th. It ultimately burned nearly 50,000 acres in and around Los Alamos, New Mexico. A summary of fire impacts is now available. The first group of samples that may have been impacted by fire emissions were the biweekly particulate matter filters removed from our AIRNET samplers and replaced with new filters on May 9th or May 10th. It should be noted that this set of samples are generally designated as the May 8th, 2000 or the 000508 samples. To expedite analysis, these samples were hand-carried to the Wastren-Grand Junction Analytical Laboratory for normal biweekly analyses and additional isotopic analyses. In an effort to assess the impact of the fire, most filters were replaced at least one more time from May 10th through May 14th. Even though filters are normally used in the field to collect continuous two-week samples, the smoke from the fire was clogging the filters after several days. Therefore we replaced the filters more frequently, to ensure that we would have as much short-term ambient air quality data as feasible for the duration of the fire.

top of page

LANL Gross Alpha/Beta Measurements

(These data were updated to include a blank correction in August 2001.)

The first data received by LANL were counts for gross beta, gross alpha, and gamma spectroscopic measurements. Gross alpha and gross beta activity from the 1999 samples are plotted for comparison with the samples collected during the fire (approximately 4/22 - 05/10, 5/11 - 5/14, and 5/14 - 5/22). The alpha and beta data did not dramatically increase until the May 11-14 samples. These data show that alpha concentrations increased by roughly a factor of ten to twenty and beta concentrations by about a factor of two to four from before the fire. The gross alpha and gross beta concentrations for the May 22nd samples, which cover approximately May 13th/14th through May 23rd, are generally comparable to pre-fire concentrations. Also plotted with the LANL gross alpha and beta results are air sampling data from other fires (Viveash fire northeast of Santa Fe, NM, and African fires). The air sampling results from these fires are consistent with the Cerro Grande fire results -- large increases in gross alpha and beta concentrations. Longer term plots of the alpha and beta data are also available.

The increases in gross alpha and gross beta were expected because decay of radon-222 produces lead-210, followed by bismuth-210, and then polonium-210, which are constantly being deposited in forests and have been accumulating for many years. These three radionuclides accumulate over time because of the 22-year half-life of lead-210. As radon gas decays in the atmosphere, it creates charged radioactive particles, many of which deposit on suspended particulate matter or other surfaces such as leaves and needles. The amount of these radioactive particles suspended in the atmosphere is measurable, but relatively small when compared to the amount present in the forests that were burned by the Cerro Grande fire. When these forests were burned, the heat and turbulence from the fire were very effective at re-entraining radioactive elements from the surfaces of vegetation, the forest floor, and the soil surface. These resuspended radon decay products caused the large increases in alpha and beta air concentrations observed during the Cerro Grande fire. Previous observation of radiaoctive emissions from other fires indicate that the major radionuclides detected will be polonium-210, bismuth-210 and lead-210. Results have been posted for polonium-210 and lead-210. These graphs show a direct relationship between gross alpha and polonium-210 and between gross beta and lead-210. The polonium-210 concentrations are higher than the gross alpha concentrations, but the gross alpha concentrations are calculated from front-face counts, which can underestimate concentrations due to burial of the alpha emitters in the filter. Gross beta activity will not be affected by burial, but it still will not include the lead-210 due to its low energy beta particles. Therefore most of the beta activity will be due to bismuth-210 which should are comparable to lead-210 concentrations because it is a short-lived decay product of lead-210. Differences in the lead-210 and gross beta concentrations may be due to differences in volatility during the fire or an unidentified beta emitter.

top of page

LANL Isotopic Measurements

(These data were updated to include a blank correction in August 2001.)

The following tables and plots of isotopic data are available:

Tables	Plots
Americium	Americium-241
Plutonium	Plutonium-238 Plutonium-239/240
Polonium	Polonium-210
Lead	Lead-210
Uranium	Uranium-238/Uranium-234

The analytical and air concentration uncertainties for the alpha isotopics (Am-241, Pu-238, Pu-239, U-234, U-235, U-238, and Po-210) are presented here as 2 standard deviations from the results and air concentrations. In December of 2000, it was determined that the instrumentation used by the analytical lab reports a much greater uncertainty, possibly as much as 5 standard deviations. ESH-17 has corrected this problem, and modified uncertainties, accurately reported as 2 standard deviations, have been posted to the web as of August 2001.

Calculated concentrations of uranium, plutonium, and americium-241 were somewhat higher than normal during the fire. However, most plutonium and americium concentrations were comparable to or below their measurement uncertainties. Even though some of the uranium measurements were above their uncertainties, isotopic comparisons generally indicate that the uranium is natural except possibly of two on-site areas, at the firing site locations where depleted uranium has been detected in the past (LA-13633-ENV) and at TA-5. Since known LANL uranium emissions are enriched (excess uranium-234 and uranium-235) or depleted (excess uranium-238), deviations from the natural one-to-one uranium-238 to uranium-234 ratio could be used to identify LANL contributions (LA-UR-99-5724). The increased isotopic concentrations during the fire appear to be primarily due to the dramatically larger uncertainties associated with the much smaller sample sizes (some sampled air volumes were about 1% of that normally sampled for isotopic analysis).

Ambient concentrations are normally calculated on a quarterly (3-month) basis because samples from six or seven two-week periods are combined together to increase the sensitivity of the measurements. Due to the possibility that the fire could increase releases of these radionuclides, isotopic analyses have been made on much shorter-term samples (two weeks or less). Since the air volumes being sampled and the mass of material being collected during these shorter periods are much lower, we cannot measure concentrations as sensitively or as precisely as we can with larger samples taken over longer periods of time. Therefore, our ability to detect low concentrations has been reduced. Most of the estimated concentrations are below the analytical uncertainty indicating that the radionuclide was not detected. However, even if a concentration was equal to the uncertainty, it would not exceed 2% of the EPA standard for the two-week sampling period ending the week of May 8th. The effects of sampled air volume on the uncertainty of the plutonium and americium measurements are shown in a this linked plot.

top of page

LANL Gamma Spectroscopy Measurements

We have also posted gamma spectroscopy data. These data do not indicate any radionuclides other than from natural sources, which include beryllium-7, lead-210, and lead-212. Occasional samples also have detectable amounts of potassium-40. Gamma spectroscopy measurements are made on groups of filters referred to as "clumps" (biweekly filters grouped across sites for a single sampling period). These clumps are grouped by general location with six to nine filters in each clump. In the AIRNET Sampling and Analysis Plan (ESH-17 1999) there is a list of the minimum detection levels for 16 gamma emitters that could either be released from Laboratory operations or occur naturally in measurable amounts (beryllium-7 and lead-210). The minimum levels are equivalent to a dose of 0.5 mrem. The beryllium-7 and the lead-210 measurements are the only isotopes normally above their minimum detectable activities. However, for the samples analyzed sooner than usual, an additional radionuclide with a short half-life, lead-212, has been measured above its minimum detectable activity. Beryllium-7, lead-210, and lead-212 occur naturally in the atmosphere. Beryllium-7 is cosmogenically produced, whereas lead-210 and lead-212 are radon decay products. Because gases produce all three radionuclides, they will quickly coalesce into fine particles and also deposit on other surfaces such as suspended particles and pine needles. Since all of the other radionuclides measured by gamma spectroscopy are normally "less than" values, measurements of these three radionuclides provide verification that the sample analysis process is working properly.

top of page

Inhalation Dose from Cerro Grande Fire

In the aftermath of the Cerro Grande fire, which occurred during May, 2000, there was considerable interest in describing the potential radiological impacts of the fire itself and of any radionuclides of Los Alamos National Laboratory (LANL) origin that may have been dispersed during the fire. A preliminary dose assessment was prepared to calculate the inhalation dose received by fire workers or members of the public during the fire (Kraig et.al 2000). At the time that study was completed, only preliminary air monitoring data were available. The current report describes recalculations based on final air monitoring data.

In the original calculation, two doses were calculated; to the hypothetical maximally exposed firemen or volunteer who was working actively in the Los Alamos area throughout the worst of the burn duration, and to the maximally exposed member of the public outside Los Alamos. Those calculations are updated here and a third is added; to a fireman or other worker in the vicinity of AIRNET (LANL's ambient air monitoring network) Station #23 in Mortandad Canyon where elevated levels of LANL-derived airborne uranium occurred during the peak of the fire. The data for the inhalation calculation were collected by the AIRNET system run by ESH-17. A summary of the completeness of data collection for each AIRNET station is included in the ESH-17 web site: http://www.air-quality.lanl.gov/CerroGrandeFire/StaRunTime.htm. AIRNET station #6, which had the highest concentrations of the primary dose-causing radionuclides in the Los Alamos Town-site during the fire, had 100 % data completeness for that period. Data used in the original calculation were preliminary and some changes have occurred in the data set since then. A modified process for including "blank" subtractions from the analytical counts resulted in slightly different concentration values in some cases. Additionally, since the first calculations, ESH-17 determined that some of the earlier reported uncertainty values were not consistently reported as equivalent to two standard deviations. It is important to note that the uncertainties propagated through the calculations below are analytical laboratory uncertainties, primarily counting uncertainty. The uncertainty associated with flow measurements in the field and those associated with time- and location-varying concentrations are not quantified.

top of page

Methods

The radiological dose calculations presented here were based on air monitoring data available as of December 2000 that were collected by the LANL AIRNET system during the Cerro Grande fire. In addition to the analyses performed routinely for uranium isotopes, plutonium isotopes, 241Am, and tritium, some of the samples taken during the fire were analyzed for 210Po and 210Pb. Lead and polonium were evaluated because of the likelihood that increases in gross alpha and gross beta activity during the fire may have resulted from increased atmospheric suspension of these and other radionuclides in the natural 222Rn decay series. As radon gas decays in the atmosphere, its decay products attach to particles in the air, many of which deposit on plants and the soil. Because most of these particles are attached to vegetation or soil, most are not normally seen in our air sampling results. It appears that the heat and turbulence associated with the fire were very effective at stripping radioactive elements from the surfaces of vegetation and soil, as well as incinerating the vegetation and soil on which the radionuclides were located. These products of radon decay became airborne and probably caused most of the large increases in alpha and beta air concentrations during the Cerro Grande fire.

To calculate radiological dose from air contaminants, air concentrations at the location of the hypothetical receptor, the duration that these concentrations were experienced, and the breathing rate during that time must be quantified or assumed. Air concentrations derived from air sampling during the fire primarily between May 9th and May 13th were used. These samples provided concentrations of 210Po, 210Pb, 238Pu, 239&240Pu, 241Am, 234U, 235U, 238U, and 3H at selected locations around LANL and Los Alamos County. The dose that is calculated here is the committed effective dose equivalent (CEDE), which is the dose quantity used by federal and state agencies. This CEDE is the dose received during the 50 years following the inhalation of radionuclides into the body.

top of page

Maximally Exposed Person Within Los Alamos Area

These calculations considered the dose contributions from naturally occurring radionuclides, such as uranium and those in the radon decay chain, and from potentially LANL-derived radionuclides including plutonium, uranium, and americium. Measured concentrations of radionuclides in the natural 222Rn decay series were approximately 1000 times greater than those of potential LANL origin. Samples of uranium isotopes in areas of public access indicate that only natural uranium was seen in the air and therefore uranium was not included in the LANL contribution but was included in the contribution from natural radionuclides.
The greatest measured radionuclide concentrations that occurred in public areas were in the western area of Los Alamos town site between May 9th and May 11th. After that time, concentrations decreased as the fire center moved north. Based on discussions with officials from the Los Alamos Fire Department, no individual could have been in that area for more than 60 hours during the period from May 8th through May 13th. Doses were calculated assuming that an individual worked in the western area for 60 hours.

Because of the short sampling times during the fire, the uncertainties associated with the plutonium and americium analyses were very large compared to the calculated concentrations. If the uncertainty of a number is larger than the number itself, the number is generally not considered quantitative. For the sake of conservatism regarding potential LANL contributions during the fire, the calculated concentrations for 238Pu, 239&240Pu, and 241Am in the Los Alamos area during the peak of the fire were used to calculate a dose. For each non-natural radionuclide (238Pu, 239&240Pu, and 241Am), the values at each of 12 AIRNET stations in the Los Alamos area were averaged for the peak fire period. Because of the very large uncertainty of any single concentration value for these radionuclides, averages were used because they are better estimates (with less uncertainty) of concentrations that may have occurred. Averages for these radionuclides for the three-year period 1997-1999 at these same stations were used to subtract background values for each radionuclide. Total (gross) doses for polonium, lead, and bismuth are reported because background values are not available for AIRNET stations.

LANL-Derived Radionuclides	Dose (mrem)[1,2]	Natural Radionuclides[3]	Dose (mrem)[1,4]
Americium-241	-0.0028 ± 0.005	Polonium-210	0.14 ± 0.005
Plutonium-238	0.00053 ± 0.002	Lead-210	0.057± 0.011
Plutonium-239	0.0026 ± 0.004	Bismuth-210	0.00083 ± 0.00016
Sum	**0.0003 ± 0.007**	Uranium-234	0.0043 ± 0.0040
		Uranium-235	-0.0001± 0.0011
		Uranium-238	0.0043 ± 0.0038
		Sum	**0.2 ± 0.01**

Footnotes:

1. The values in parentheses are two standard deviations, in mrem, of the reported numbers.
2. Uranium is not included here because our air sampling results indicate that all sampled uranium was natural in origin.
3. This analysis does not include other natural radionuclides that may have contributed to the dose. Radionuclides from the 220Rn decay series are not included because they are too short lived to be evaluated with the analytical methods we used even though they probably caused some of the increased gross alpha concentrations for samples counted shortly after they were collected. Because of extremely large temporal and spatial variations in the amount of natural uranium present in the atmosphere a value representative of the increase during the fire cannot be calculated. Because of temporal variations, using an historical average at several sites would tend to underestimate the airborne uranium that would be expected during the high winds that coincided with the fire. Additionally, no consistent appropriate background value are available because the areas around, but fairly distant from Los Alamos, which are usually used as background stations for other radionuclides, have higher natural airborne uranium concentrations than the Los Alamos area.
4. Normally, "composite" samples are composited for three months before they are analyzed isotopically. These composite samples represent 12,000 to 14,000 m3 of air sampled. Typically, plutonium and americium air concentrations are equal to or slightly less than their associated uncertainties. During the Cerro Grande fire, sampler filters were changed out after only about three days and individual samples were sent immediately for isotopic analyses. No filters were composited. These samples represented about 200 m3 of air. Because the samples represented much smaller air volumes than normal samples, the uncertainties associated with the isotopic analyses of plutonium and americium were more than an order of magnitude larger than our usual uncertainties. Because there was so much more airborne 210Po and 210Pb than plutonium or americium, the uncertainties associated with the Pb and Po were a much smaller fraction of the reported concentration than they were for plutonium and americium. In other words, the polonium and lead data were very significant whereas most of the plutonium and americium values were on the same order of or smaller than their associated uncertainty, and are not considered significant statistically.

The doses from three uranium isotopes are shown with the natural radionuclides because the isotopic ratio of 238U to 234U indicates that the airborne uranium was of natural, not LANL, origin. This conclusion is reached by comparing the dose (or activity concentration of) from 234U and 238U, which are about equal in natural uranium. The calculated doses from americium and plutonium show the large uncertainty with extremely small numbers and are not statistically significant. The doses from polonium, lead, and bismuth are statistically significant (because the concentration is much larger than its uncertainty) and represent the increase in airborne concentrations of these natural radon products during the fire. However, these calculations didn't include subtraction of background, normal radon products because no data on pre-fire air concentrations for these radionuclides were available. The actual doses from the radionuclides tabulated above were less than those reported, but, these doses do not include other radionuclides in the 222Rn decay series, which are too short-lived to evaluate in this way. Tritium was not included in this analysis because none of the AIRNET stations showed tritium above background levels during the fire.

To put some perspective on these doses, a person travelling on a two- hour flight in a jet airliner would receive approximately 1 mrem, and people living in the Los Alamos area receive about 360 mrem from natural sources each year. No health effects are expected from the short-term increase in natural radioactivity associated with the Cerro Grande fire. There was no measurable increase in LANL-derived airborne radionuclides in the Los Alamos town-site or residential areas during the fire.

top of page

Maximally Exposed Person Outside the Los Alamos Area

Outside of Los Alamos, Espanola had the highest concentrations of gross alpha and gross beta radiation and these occurred between May 8th and May 11th. In fact, the local gross alpha concentrations do not appear to have increased above normal levels other than during this period. The concentrations of individual radionuclides from May 8th to May 11th were used to calculate the dose someone might have received had they been outside throughout that 72-hour period. The results of these dose calculations are summarized below. Background concentrations (what are normally seen) were not subtracted from the polonium, lead, or bismuth concentrations to make these calculations.

LANL-Derived Radionuclides	Dose (mrem)[1,2]	Natural Radionuclides[3]	Dose (mrem)[1,4]
Americium-241	-0.003 ± 0.01	Polonium-210	0.022 ± 0.001
Plutonium-238	-0.003 ± 0.004	Lead-210	0.030 ± 0.011
Plutonium-239	-0.001 ± 0.008	Bismuth-210	0.00044 ± 0.00016
Sum	**-0.007 ± 0.2**	Uranium-234	0.0019 ± 0.0034
		Uranium-235	0.0002 ± 0.003
		Uranium-238	0.0027 ± 0.0029
		Sum	**0.06 ± 0.01**

Footnotes: please see preceeding table

The doses from lead, polonium, and bismuth are quite small, barely above those that would have been experienced had the Cerro Grande fire never happened, and are due to the slight increases in airborne natural radioactive elements. The negative doses for plutonium and americium are obviously meaningless but result from the large uncertainties in these numbers.

As described above, these doses may be compared with the approximately 360 mrem dose received each year from natural background radiation in northern New Mexico, primarily form cosmic radiation and naturally occurring radioactive materials in soil and food. The calculations indicate that the doses are insignificant. No health effects are expected to occur as a result of radiological intakes during the Cerro Grande fire.

top of page

Worker Exposed to Elevated Uranium Near AIRNET Station #23, Technical Area #5

The AIRNET Station # 5 showed elevated uranium levels during the sampling period ending May 13th. Significantly, the 238U air concentration was more than double the 234U concentration, indicating a likely LANL source for some of the airborne 234U and 238U. Based on the ambient air measurements and the assumption that depleted uranium from LANL is approximately 30% 234U, by activity, the calculated LANL contribution to the elevated 234U and 238U concentrations at Station #5 were approximately 1,221 and 3,700 aCi m-3, respectively. The doses from these concentrations were calculated to evaluate the LANL contribution to worker doses in that location. A worker was assumed to be breathing these concentrations for 60 hours, even though it is very unlikely that this occurred. The radiological doses from 234U and 238U were determined to be 0.024 (0.001) and 0.067 (0.003) mrem, respectively with the one standard deviation value in parentheses. The doses from 235U would have been much smaller than those from the other two isotopes. These are very small radiological doses and no health effects would be expected from them.

For uranium, toxicological effects should be considered as well as the radiological effects. It is appropriate to compare the concentrations and total intakes of uranium during the fire with standards based on toxicological effects. The total intake of uranium during the assumed 60 hours of exposure was calculated to be 0.002 mg and the average air concentration of total uranium was about 0.00001 mg m-3. The average air concentration was many orders of magnitude below any published limits for workplace or other exposure. For example, the American Council of Industrial Hygienists has a time-weighted average limit of 0.2 mg m-3 for workday exposure to uranium compounds (compiled in the NIOSH Pocket Guide to Chemical

Hazards, US Dept, of Health and Human Services 1985). The Agency for Toxic Substances and Disease Registry (ATSDR) developed Minimal Risk Levels (MRLs) to estimate exposure levels that represent minimal non-cancer health risks. For insoluble uranium compounds inhaled for more than a day, their published MRL is 0.008 mg m-3 (these are available at site: http://www.atsdr.cdc.gov/mrls.html). Sixty hours of exposure at the MRL air concentration would result in a total intake of 1.2 mg (assuming a breathing rate of 2.5 m3 h-1. Sixty hours of intake at the concentrations of uranium at AIRNET Station #23 would have resulted in an intake of 0.0017 mg, several orders of magnitude below the MRL. No radiological or toxicological health effects are expected from these potential exposures.

- David H. Kraig, Thomas E. Buhl , Craig F. Eberhart, and Ernie S. Gladney, Updated Calculation of the Inhalation Dose from the Cerro Grande Fire based on Final Air Data, LA-UR-01-1132, February 2001.

top of page

LANL PM-10 Discussion

In addition to the AIRNET system, the Laboratory has recently begun operating a particulate matter monitor at TA-54-1001 (TA-54 West, located about 2 km west of waste disposal Area G). This monitor, known as a Tapered Element Oscillating Microbalance (TEOM), continuously monitors concentrations for particulate matter less than 10 um in diameter (PM-10). The TEOM monitor provides an average air concentration every 30 minutes. The EPA has established a 24-hour standard of 150 ug/m^3. The 30 minute TEOM data have been averaged over a running 24 hour period, so that comparisons can be made to the EPA standard.

We have posted a graph of the PM-10 data for the period leading up to and including the fire. During the early days of the fire, air concentrations at TA-54 were only slightly elevated. A small portion of the fire moved through TA-54 West, during 5/12 and 5/13. During this period short term air concentrations were as high as 1000 ug/m^3.

top of page

Summary of Air Monitoring at MDA-R

Material Disposal Area (MDA) R, located at Los Alamos National Laboratory Technical Area (TA)-16, began smoldering when the Cerro Grande fire ran over the site on May 10/11. Workers at the site reported that tree roots, railroad ties, and cabling were the materials burning within MDA-R.

MDA-R is a World War II-vintage high explosives burning area, approximately 200 yards long and 60 feet wide. Previous limited characterization of the area has revealed concentrations of barium, cobalt, lead, silver and zinc at levels greater than background. No uranium above background levels was found in this sampling. High explosives residues, particularly RDX and TNT, also are present.

Contractors used a one-of-a-kind remote robotic excavator to scoop up chunks of smoldering debris, move it to a nearby clear area and douse it with water, making sure that none of the water reached any of the nearby stream channels. The smoldering materials were extinguished on 6/14. Photos and a chronological presentation of news releases are available.

Preliminary air sampling at MDA-R on May 26, by the ESH-10 Hazmat Team, revealed no occupational risk to employees from hazardous materials. A particulate matter monitoring station for inhalable particles (PM-10) was operated from May 26-May 30; these samples will be analyzed for metals and radionuclides. Volatile organic chemical (VOC) monitors and two total suspended particulate (TSP) monitors were started on June 2. The samplers were placed at the approximate west and eastern ends of the MDA. These locations were selected based on local winds, availability of power, and remaining clear of the earth moving equipment.

Los Alamos is splitting the particulate matter samples with the New Mexico Environment Department for independent analysis. Preliminary gross alpha and gross beta screening demonstrated no above background levels of radioactivity. VOC results demonstrate that no VOCs were emitted from MDA during the sampling period. Compounds measured in highest amounts (ethanol and acetone) are commonly found in all air samples. One likely source is the decomposition of organic matter through natural soil processes. All results will be posted on the Laboratory's Air Quality web page.

top of page

Other Organization's Information

Data from other organizations (USEPA, DOE/RAP, and NMED) making air quality measurements in Los Alamos during the fire may be found at www.NMENV.state.nm.us/aqb/fires/default.htm.

top of page

El Cerro Grande Alpha and Beta Air Concentration Trend Plots

Sampling Site Groups	Alpha	Beta
Northern NM Region	Alpha	Beta
Los Alamos Townsite - Eastern Perimeter	Alpha	Beta
Los Alamos Townsite - Western Perimeter	Alpha	Beta
White Rock & LANL Eastern Boundary	Alpha	Beta
LANL On-Site - General	Alpha	Beta
LANL On-Site - Firing Sites (TA-15)	Alpha	Beta
LANL On-Site - DP West (TA-21)	Alpha	Beta
LANL On-Site - Waste Disposal Area (TA-54)	Alpha	Beta

top of page

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